3.2 Fire/Fuels

Introduction

This section describes fuels and potential fire behavior in the Como Forest Health project area. The analysis discloses the effects of timber management and fuels treatments on fire intensity in the forest, especially the wildland urban interface, and fire management options.

Summary of Effects

Alternatives 2, 3 and 4 reduce fuels through a combination of commercial and non-commercial thinning, slash treatment, and prescribed burning. All treatments would improve fire management options by potentially changing fire to surface type fires in the event of a wildland fire. No fuels would be treated under the no action alternative except by wildfire and previous vegetation treatment decisions. Fuels would continue to accumulate until a wildland fire ignites.

3.2.1 Overview of Issues Addressed

Natural fire return intervals in the Como Forest Health Project area are 0-35 years in the lower elevations and 35-200 years at the mid- to upper elevations. Under these conditions, fire would most likely be low severity at the lower elevations and mixed to high severity at the upper elevations. Mixed severity fires range from low to high severity, which creates a mosaic of apparently unburned areas mixed with fire-created openings in the forest canopy. Current fuel conditions in the project area indicate that most fires would burn at moderate severity with a high potential for intermittent crown fires, “torching”. The high potential for torching increases the potential for crown fire during a wildland fire depending on fuel moisture, winds, and temperatures. Fuels need to be modified in the project area to reduce the potential for crown fire and increase the amount of area with potential of low severity fires, “surface”.

By reducing fuel loads, we reduce the potential that fire would get into and spread through the forest canopy. Surface fire behavior is less extreme than a crown fire. It travels slower and doesn’t burn as hot. The fire manager would have more time to evaluate resources at risk and plan strategies that protect resource values while using fire to promote resource objectives. Fire is a natural force in Bitterroot National Forest ecosystems. Though we cannot control lightning-caused ignitions, we can modify fire behavior by modifying fuels. Reducing the potential a fire would transfer from a surface fire to a crown fire, protects firefighter and public safety, private property, and natural resources in the Como Forest Health Project area. To achieve this purpose, we need to reduce excess fuel loads to levels consistent with the fire regime of the vegetation response unit (VRU).

3.2.1.1 Issue Indicators

Fire type is an indicator of treatment effects on fuels and fire behavior because of the relationship between fire type, safety, and fire behavior (Rothermel 1983, Finney 2004, Van Wagner 1977). Fire type is modeled using FlamMap, a fire behavior model, based on fuel models, topography, and weather. Fire type categories are: surface, torching, or crown fire.

3.2.2 Regulatory Framework

Direction for managing fire on National Forest comes from the following laws, regulations, and policies:

- Organic Administration Act, June 4, 1897 (16 U.S.C. 551). This act authorizes the Secretary of Agriculture to make provisions for the protection of National forests against destruction by fire.
- National Forest Management Act, October 22, 1976 (16 U.S.C. 1600 et seq.). This act directs the Secretary of Agriculture to specify guidelines for land management plans to ensure protection of forest resources. Regulations at Title 36, Part 19 of the Code of Federal Regulations (36 CFR 219.27) specify that, consistent with the relative resource values involved, management prescriptions in forest plans must minimize serious or long-lasting hazards from wildfire.
    - The Bitterroot National Forest Plan (USDA Forest Service 1987) and Fire Management Plan includes forest-wide fire management direction that is consistent with other resource goals (Forest Plan Appendix M-1). The Bitterroot National Forest Fire Management Plan (USDA Forest Service 2013 Update) is an annually updated operational guide. For all fires, the priority is protection of human life, and firefighter, aviation, and public safety. Emphasis areas include improving prevention and suppression activities; reducing hazardous fuels – particularly around communities, interface areas, and high-priority watersheds at risk; restoring fire adapted ecosystems; promoting collaboration among governments, communities, and stakeholders; and being accountable through performance measures and monitoring for results (USDA Forest Service 2006b).
      The Forest Plan, Appendix M-1, directs that fire programs be cost effective, compatible with the role of fire in ecosystems, and responsive to resource management objectives, including:
        - Using prescribed fire to maintain healthy ecosystems that meet land management objectives.
        - Emphasizing fire ecology when applying prescribed fire and using fire ecology reference documents.
        - Attempting to integrate an understanding of fire's role in regulating stand structure into development of silvicultural prescriptions.
        - Emphasizing the use of prescribed fire in range and wildlife habitat improvement projects.
        - The Forest Plan requires full suppression responses only in Management Area 1 (USDA Forest Service 1987, III-7). The full range of wildland fire management responses, from suppression to wildland fire management, is allowed in all other Management Areas (Forest Plan 1987).
- National Environmental Policy Act, January 1, 1970 (Pub. L. 91-190; 83 Stat. 852, 42 U.S.C. 4321-4347). This act requires all land management agencies to prepare environmental documents when there is an action that may have impact on the

environment. The documents are prepared by interdisciplinary team members and must include assessments using natural and social sciences; alternative actions; a proposed action; public involvement and collaboration; and public notice before, during, and after decisions.

- Federal Wildland Fire Management Policy, February 2009. This Guidance provides for consistent implementation of the 1995/2001 Federal Fire Policy, as directed by the Wildland Fire Leadership Council. The 2009 Guidance reaffirmed that firefighter and public safety are the overriding priorities in all wildland fire management. The 2009 Guidance changed some terminology, as in wildland fire describing any non-structure fire that occurs in the wildland. Wildland fires are categorized into two distinct types:
  - Unplanned fires are natural ignitions, human-caused ignitions, and planned ignitions that are declared wildfires.
  - Planned ignitions are prescribed fires.
- Interagency Prescribed Fire Planning and Implementation Procedures Guide, April 2014. PMS 484. This guide provides unified direction for prescribed fire planning and implementation for the U.S. Department of the Interior's Bureau of Indian Affairs, Bureau of Land Management, National Park Service, Fish and Wildlife Service, and the U.S. Department of Agriculture Forest Service.
- Fire Management Analysis and Planning Handbook (FSH 5109.19). This handbook provides detailed instructions for fire management and activity planning, and burn plan preparation, and project monitoring.
- Ravalli County Community Wildfire Protection Plan (January 2010 Update). Developed in response to items identified in the National Fire Plan 10 year Comprehensive Strategy and in the Healthy Forest Restoration Act of 2004: four primary areas of emphasis are:
  - Fire Prevention and Suppression
  - Hazardous Fuel Treatment
  - Restoration of Fire-adapted Ecosystems
  - Community Assistance
- The National Strategy: The Final Phase in the Development of the National Cohesive Wildland Fire Management Strategy April 2014. The National Strategy establishes a national vision for wildland fire management, defines three national goals, describes the wildland fire challenges, identifies opportunities to reduce wildfire risks, and establishes national priorities focused on achieving the national goals.

3.2.3 Affected Environment

This section describes the current fire and fuel conditions relative to historic conditions and the consequences of departure from them in the Como Forest Health Project area. It also describes the WUI and the potential and desired fire behavior.

3.2.3.1 Existing Condition

Fire Groups and Fire Regimes

Historically, wildland fire played a key role in shaping vegetation in the Como Forest Health Project area. Fire's role effect on vegetation is described by fire regime and fire groups. A "fire regime" describes how fire naturally functions in terms of extent, severity, and frequency in a particular place (Hardy and others 2001). Fire Groups describe how habitat types respond to fire based on the response of the dominant tree species to fire and their roles in forest development (forest succession) (Fischer and Bradley 1987). There are several ways to characterize vegetation, fuels, and fire regimes depending on the application. Table 3.2- 1 shows the relationship between fire regimes and fire groups and describes vegetation and fire processes in this and the Silviculture and Forest Management sections.

Table 3.2- 1: The Relationship of Fire Regime and Fire Groups, and Descriptions of Fire's Role in the Como Forest Health Project (Adapted from Hardy et al. (2001) and Schmidt et al. (2002)

NATURAL FIRE REGIME	FIRE GROUP	FREQUENCY (MEAN FIRE RETURN INTERVAL)	SEVERITY	PORTION OF ANALYSIS AREA[1]	DESCRIPTION
I[1]	**2, 4**	**0-35 years, Frequent**	**Low & Mixed**	**5% (298 Ac.)**	Habitats in Fire Regime I generally experience low severity fires, replacing less that 25% of the dominant overstory vegetation. This fire regime can also include mixed severity fires that replace up to 75% of the overstory. These frequent fires typically create open understory stand conditions. Forest gaps, created when individual trees and small groups of trees die, provide sites for regeneration that create small inclusions of higher density trees. Localized, heavy accumulations of fuels heat some tree boles and roots to lethal temperatures. Stand-replacing fires result when heavy accumulations of fuel are contiguous throughout the stand.
II	4,5	0-35 years, Frequent	Stand Replacing	5% (278 Ac.)	Fire Regime II applies to grass and shrub habitat types. High severity fires replace more than 75% of the dominant overstory vegetation. Fire top-kills stands of grass and willow, but causes a "stand- replacing" effect in bitterbrush and mountain mahogany. In the grassland and willow communities, vegetation development often occurs from the re-sprouting of existing plants. Bitterbrush and mountain mahogany however, rarely resprout and fire in this community results in seral stages that are dominated by grasses and forbs

Natural Fire Regime	Fire Group	Frequency (Mean Fire Return Interval)	Severity	Portion of Analysis Area[1]	Description
III	**6, 8**	**35-200 years**	**Low & Mixed**	**67% (3,802 Ac.)**	Fire Regime III has a longer fire return interval than Fire Regime I and II. Because disturbance occurs less often, vegetative density increases and fuel accumulates, resulting in fires of greater intensity and severity than Fire Regime I and II. Larger areas of mortality generally result, creating more diversity in age and size classes on the landscape.
IV	9, 11	35-200+ years	Stand Replacing	20% (1,134 Ac.)	Fire Regime IV has a similar fire frequency as Fire Regime III; however, fires generally result in greater mortality because stand densities in lodgepole pine communities, the dominant vegetative type in this fire regime, are higher than those found in the drier vegetative communities in Fire Regime III. Additionally, lodgepole pine, due to its thin bark, is less resistant to fire than those species found in Fire Regime III. Arno (1976) noted that large fires in the lodgepole pine communities and spruce-fir types historically resulted from a combination of high fuel loading, drought, and wind. He also noted that non-lethal fire may have occurred in lodgepole pine forests at some time between the stand replacing events, possibly at intervals as short as 40-80 years.

[1]The most common fire regimes in the project area in bold print.

Fire is described by intensity and severity. Fire intensity is a measure of the rate of heat (energy) released from organic matter in a fire. Fire severity is the degree to which a site has been altered or changed by fire (Keeley 2009). Since we do not know the specific burning conditions of future wildland fires, we can not use fire intensity to describe future wildland fires. We use fire severity to describe the effects of fire in this analysis.

A low-severity fire is characterized by minimal, short-term ecosystem effects. Soils are not heated, and overstory vegetation is rarely affected. The result of a low-severity fire is fuel reduction and topkill of understory vegetation. In dry forests that historically burned with a low-severity fire regime, most of the trees have thick bark that prevents damage to the bole. The shrubs and herbs are adapted to burning and either sprout from the root collar or rhizomes or have refractive seed that is stimulated to germinate by the heat of the fire (Agee 1993, Agee 1998, Debano and others 1998, and Walstad and others 1990).

A mixed-severity fire exhibits the range of effects on the dominant vegetation from low to high fire severity (Figure 3.2- 1). Mixed severity fires haveareas of low fire severity and show little damage to the overstory vegetation. Other areas have moderate fire severity and show considerable overstory mortality but not complete replacement. There are also areas of high fire severity with complete overstory mortality (Agee 1993, Agee 1998, Debano and others 1998, and Walstad and others 1990).

Figure 3.2- 1: Example of a Moderate Severity Prescribed Fire (photo from Colorado State University)

A high-severity fire has dramatic ecosystem effects, such as complete canopy mortality and extensive soil heating (Figure 3.2- 2). It occurs at the extreme end of the fire severity continuum and is expressed by complete fuel consumption, extensive soil heating, and usually more than 70 percent top-kill of vegetation (Agee 1993, Agee 1998, Debano and others 1998).

Figure 3.2- 2: Example of a High Severity Wildfire (crown fire) – 41 Fire Complex 2011

Natural and human-caused fires perpetuate fire-adapted plant communities, maintain ecosystem health and function, create vegetation mosaics, and reduce the potential of high severity, stand replacing fires. Frequent, low severity fires were common at lower elevations in Fire Groups 2, 4 and 6, while mixed to high severity fires burned less frequently at elevations above 6,000 feet in Fire Groups 5, 8, 9 and 11 in the Como Forest

Health project area *Figure 3.2- 3*). This diversity of Fire Groups in the project area creates a diversity of vegetative structure across the landscape.

Historical fire regimes in the Como Forest Health Project analysis area had short to moderately short fire-free intervals of 0-35 years, and were not typically stand replacing fires (Table 3.2- 1).

Non-stand replacing fire regimes (Fire Regimes I and III) represent about 4,100 acres or 72% of the Como Forest Health Project area and fire regimes with long fire return intervals (Fire Regimes II & IV) represent 1,611 acres or 28% of the area.

Studies of fire history and fire ecology in western Montana, and specific to the Bitterroot National Forest, indicate that stand-replacing fires are not typical to most of this area (Barrett et al. 1997, Arno et al. 1995, Agee 1993, Fischer and Bradley 1987, Arno and Gruell 1986, Arno and Petersen 1983; Habeck 1976, and Habeck and Mutch 1973). John Leiberg, who surveyed the Selway sub-basin in 1897-98, indicated that approximately 35 percent of the surveyed area had burned within the previous 40 years (Leiberg 1899). Arno (1976) found evidence in the West Fork and Tolan Creek drainages of the Bitterroot National Forest that fires of low-to-moderate severity occurred most often over the landscape, with occasional stand-replacing fires. He found an average fire-free interval of 11-16 years in ponderosa and Douglas-fir habitat types during the period 1734-1889. His fire chronologies show a pattern of frequent, average-sized fires spreading to about a square mile (640 ac). On average, a fire occurred in the drainage every seven years. The chronologies also showed that a very large fire, in excess of four square miles (2,560 ac), occurred approximately every other decade. These large fires were low-severity with some mixed-severity areas.

Twenty eight fire ignitions were recorded from 1970-2012 within the Como Forest Health project area (Table 3.2-2, Figure 3.2- 4); 25% percent of those ignitions were lightning-caused, and 75% were human- caused. Most of the fires were small, in part because of effective fire suppression, and did not perform their historic role of reducing surface and ladder fuels.

According to the fire history records of the analysis area, there have been six large wildfires over 100 acres in size since 1889 (Figure 3.2- 4). Most of these fires have been at lowest and highest elevations (1924, 1975 and 1918) and affected ponderosa pine and Douglas fir/lodgepole habitat groups. The most recent large fire in the analysis area was the Rockin Fire, which occurred in 2005 and burned a total of 5,933 acres.

Disruption of the natural fire regime can cause fire effects outside the natural range of variability. Fire suppression in the project area has extended the fire return interval. However, timber harvests in the project area since the late 1800s have compensated as change agent in lieu of fire. The vegetation composition, structure, and fuels in low-elevation ponderosa pine and Douglas-fir forest types are outside the natural range for the fire regime, and are at risk of losing key ecosystem components, like flammulated owl habitat and big game hiding cover, in the event of a wildland fire. Fires occurring in these forest types are uncharacteristic compared to the natural fire regime in terms of behavior, severity, and patterns. Typically, large fires occurring under these conditions are prone to torching and some crown fire behavior (*Figure 3.2- 3*).

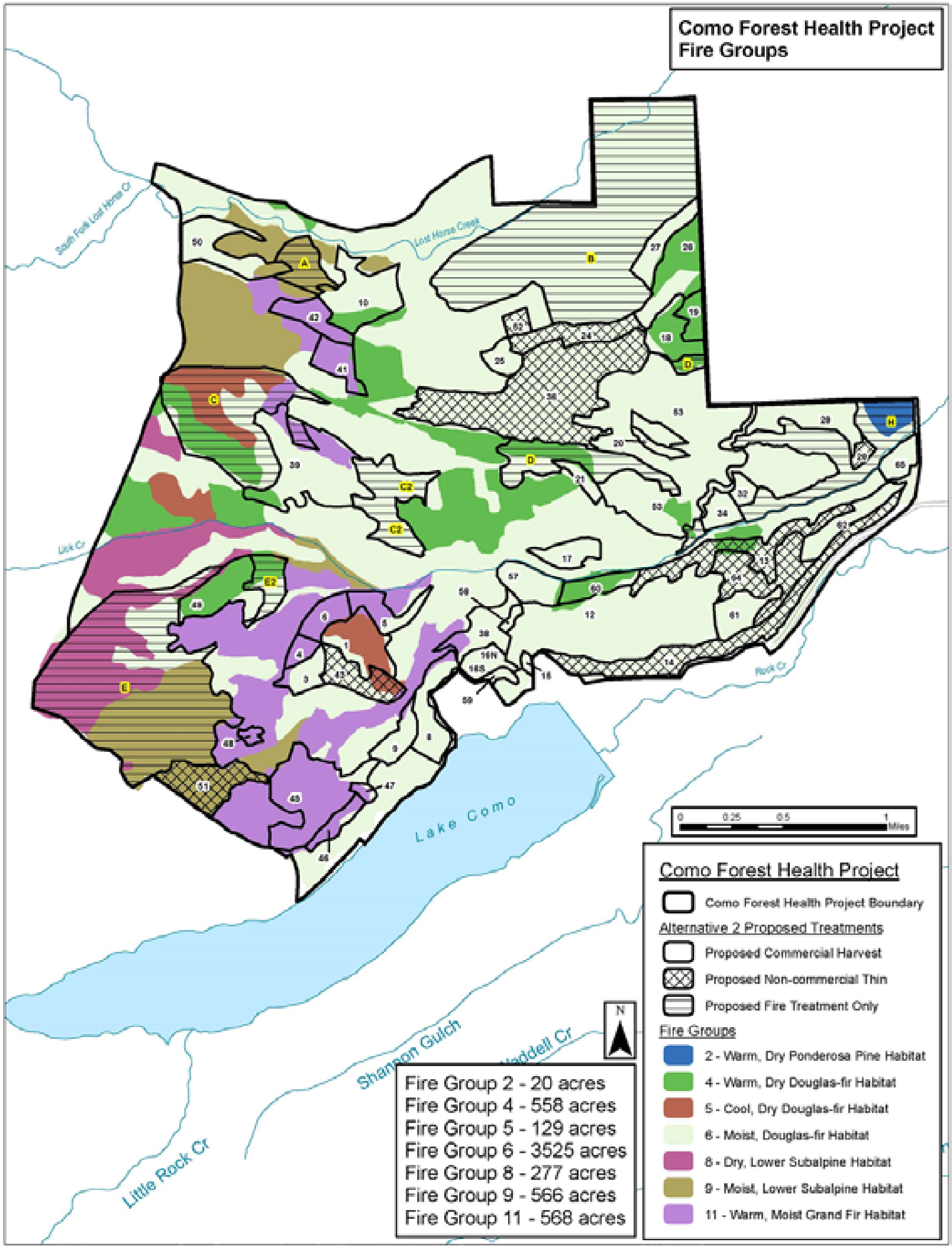

Figure 3.2- 3: Fire Groups in the Como Forest Health Project Area

Current Fuels Conditions

The most important changes in stand structure and composition in the Como Forest Health project area is the increase of small to medium-sized, shade tolerant and fire-sensitive conifers in the understories of low elevation, drier site forests. Higher densities of shade tolerant tree species in the understory lowers crown base heights and links surface fuels to crown fuels. These understory trees act as ladders that allow fire to burn into the overstory tree crowns. Fire exclusion promotes the development of multi-storied and multi-aged forests of shade tolerant species and higher fuel loads in the understory. The higher fuel loads preheat the vegetation during a fire and increase the probability that fire will move from the surface to trees with low crowns and into the overstory crowns. Thus, the larger, overstory trees that survived many low severity fires are killed by the crown fire.

Table 3.2- 2: Fire History and Ignitions in the Como Forest Health Analysis and Project Areas

*Fire History in the Analysis Area (6th order HUCS)		
Decade	**Fire Count**	**Area (acres)**
1880	2	110.68
1900	6	799.14
1910	11	3,897.50
1920	10	5,094.56
1930	6	985.62
1940	1	52.55
1970	5	2,380.76
1980	18	14,357.91
2000	14	8,876.86
Total	73	36,555.56
***Fire History in Como Forest Health Project Area**		
1900	2	270.94
1910	2	278.47
1920	5	509.79
1970	2	1,036.83
1980	3	33.25
Total	14	2,129.27
Fire Starts1970-2012	**Analysis Area**	**Project Area**
Lightning	113	8
Human caused	48	20
Total	161	28

*No fires were recorded in the Como Forest Health project area for 1990, 2000, and 2010 though several unattended campfires were extinguished.

Increased stand density decreases the space between tree crowns. The tighter the spacing the easier it is for fire to move from crown to crown. The mechanism for this fire behavior is provided by wind, so the tighter the tree crown spacing the less wind it takes to move fire through the tree crowns. Therefore, even though wind speed may increase through a thinned forest, and the fire may move faster and exhibit higher surface fire intensity, the chance of a crown fire is diminished (*Figure 3.2- 5*).

Subalpine fir forests are located in some riparian and higher elevation sites within the project area. In the project area, Vegetation composition, structure, and fuels in this forest type moderately depart from the natural fire regime, which predisposes the forest type to the loss of key ecosystem components in the event of a wildland fire. Fires would be moderately uncharacteristic compared to the natural fire regime in terms of behavior, severity, and patterns. Typically, large fires that occur under these conditions are subject to the range of fire behavior from surface to crown fire.

Figure 3.2- 4: Fuels in Unit 50 in all Alternatives(increased stand density)

Fires have been suppressed for the past 125 years on a large portion of the project area, which has extended the fire return interval. The proximity of the project area to private land, its high recreation value, terrain, and prevailing wind directions restrict fire management options. Consequently, fires are most often suppressed and fuels reduced through timber harvest, slash treatment, and prescribed burning. The potential for torching fire transitioning to crown fires is higher than the historic conditions because fuels have accumulated and shade-tolerant trees have regenerated in the understory since the last treatment entries in the 1990s.

Current Fire Behavior

Fire behavior is the manner in which a fire reacts to available fuels, climate, local weather, and topography. A change in any of these components changes fire behavior (DeBano et al. 1998). “Extreme” fire behavior implies a level of fire behavior characteristics that ordinarily preclude methods of direct fire control. One or more of the following is usually observed during times of extreme fire behavior: high rates of spread, high flame lengths, crowning fires, spotting ahead of the main fire, fire whirls, or strong convection columns. Such fires often behave erratically because they can influence the local fire weather, making a fire less predictable and more dangerous (Rothermel 1991). Fire behavior is most often characterized by fireline intensity (directly related to easily observed flame length), rate of spread, and fire type (Rothermel 1983, Finney 2004, Van Wagner 1977).

There is high potential for a large fire to occur in the analysis area that may impact the Como Forest Health project area due to predominant winds that come from the west/southwest, ignition patterns, and fuels buildup. Old fires and fuel reduction treatments older than 14 years tend to burn at moderate or high severity (Lydersen et al. 2014). Locally, on the Bitterroot National Forest fires and fuel treatments older than 8-10+ years are no longer considered effective fuel breaks as fires burn through these areas. Past timber harvests and fuels treatments in the project area are generally older than 15 years. The 1988 Rock Creek and 2005 Rockin fires quickly escaped initial attack efforts and threatened natural resources and Lake Como Recreation area (adjacent to the Como

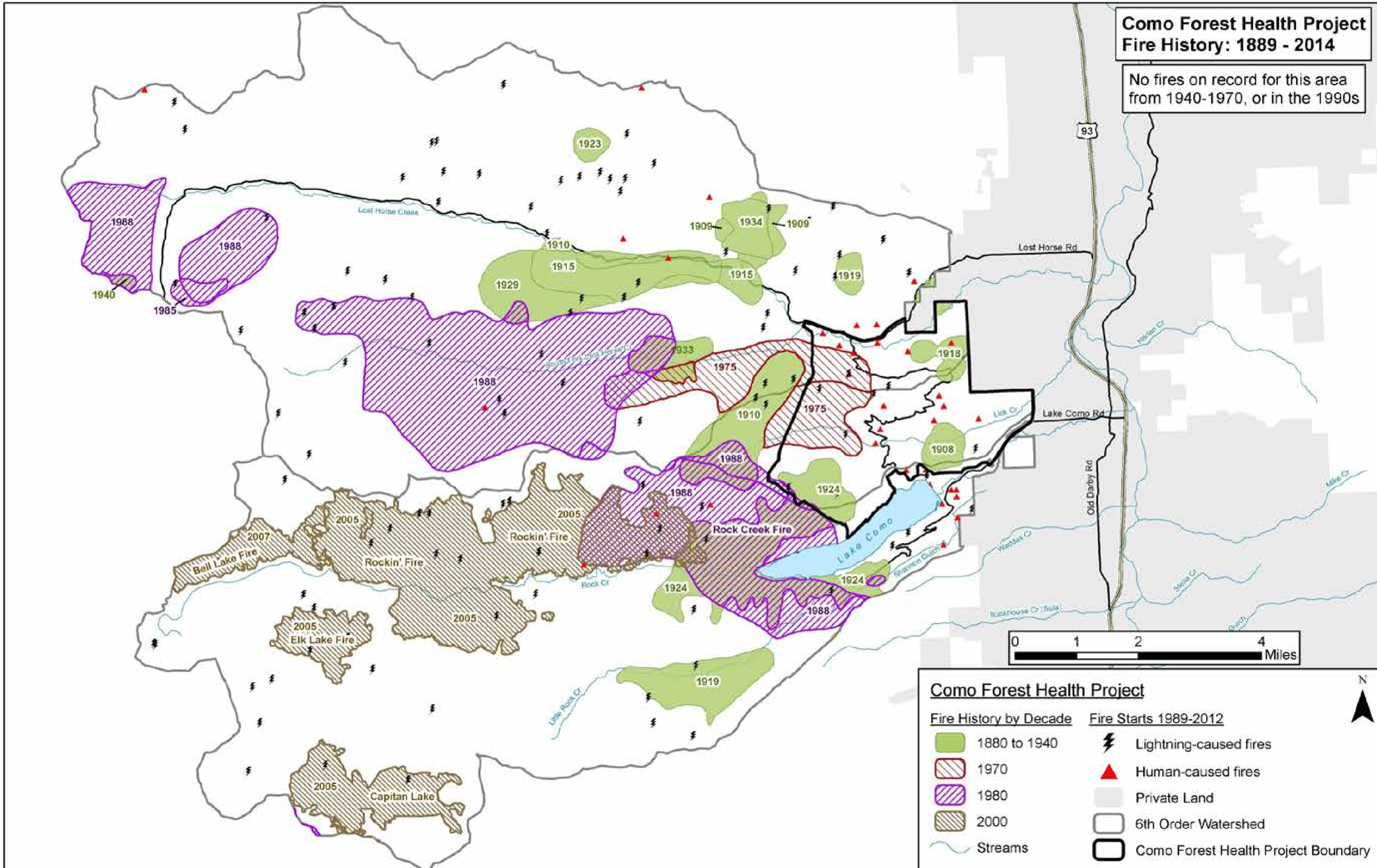

Figure 3.2- 5: Fire History and Ignitions in Como Forest Health Analysis Area

Project Area). Even with readily available initial attack resources within one hour of detection, both fire(s) grew from spots and escaped initial attack.

Local weather, fuel, topographic and ignition patterns, and the values at risk from wildland fire were considered when the Como Forest Health wildland-urban interface (WUI) was delineated (Figure 3.2- 6). A large fire (100 acres) or multiple ignitions in one day between Rock Creek and Lost Horse drainages has the potential to overwhelm suppression forces and could burn to the national forest and private land boundaryies to the east (under extreme fire conditions). The 1988 Rock Creek Fire, the 1994 Ward Mountain Fire, the Blodgett Fire in 2000, demonstrated this scenario, as did the Rombo Mountain Fire 2007 in which values were at risk and several homeowners evacuated. The Wilderness and Inventoried Roadless Area boundaries are mid-slope with continuous brushy fuels from the older Rockin and Rock Creek fires.

There are fewer fire breaks to the west of the Rock Creek and Rockin fires to impede fires moving toward the Selway Bitterroot Wilderness. However, westerly winds tend to push wilderness fires –towards the east. Winds coming from the south or southwest may push the fire north towards Lost Horse drainage and adjacent developments. Lightning fires can ignite in the Como Forest Health project area so the ridgeline and high elevation scree slopes would not provide natural barriers to wildland fire spread. These fires are generally exposed to upper level westerly or southwest winds that, when aligned with continuous fuels, increase the potential a fire high on the Bitterroot face would move down or across slope toward the WUI. The topography in the project area favors cross-slope fire movement. Burning material can roll down the steep slopes and, when aligned, the fire burns uphill at a faster rate and increases fire growth potential.

From the 1990s through the present, fire sizes on the Bitterroot National Forest have been growing due to increases in fuels, larger patch sizes, bugs and drought, and changes in stand composition and structure. Fire suppression has removed fire as a natural disturbance coupled with past harvest inadvertently reduced the likelihood of non-lethal fire and effectively increased the potential of high severity fires in the Como Forest Health project area.

Current Fire Types

“Fire Type” describes whether the fire is a surface fire, an intermittent crown fire (torching fire), or a crown fire. A surface fire burns in the understory with relatively low flame lengths and intensities and consumes litter, duff, and low-growing vegetation. A torching fire is a fire where flames move from the surface to consume single or small groups of overstory trees. Tree torching is determined by weather, total fuel load, live fuel moistures, and ladder fuels (Andrews and Chase 1989). Torching fire behavior is higher intensity than surface fire, but is not sustained. A crown fire is one that becomes well-established in the overstory, moving from tree crown to tree crown at high intensities and high rates of spread while consuming surface fuel as well as overstory tree crowns. Crown fires are sometimes referred to as stand-replacing fires. Crown fire potential is increased by high wind speeds, low foliar moisture content, high surface fire intensity, presence of ladder fuels, sufficient canopy bulk density to sustain fire spread, and an unstable atmosphere (Van Wagner 1977, Rothermel 1991). Once a crown fire is established it tends to affect large areas because it moves fast and is usually impossible to control until fuel or weather conditions change the fire behavior. Figure 3.2- 6 shows the fuel types in the project area as modeled using Flammap.

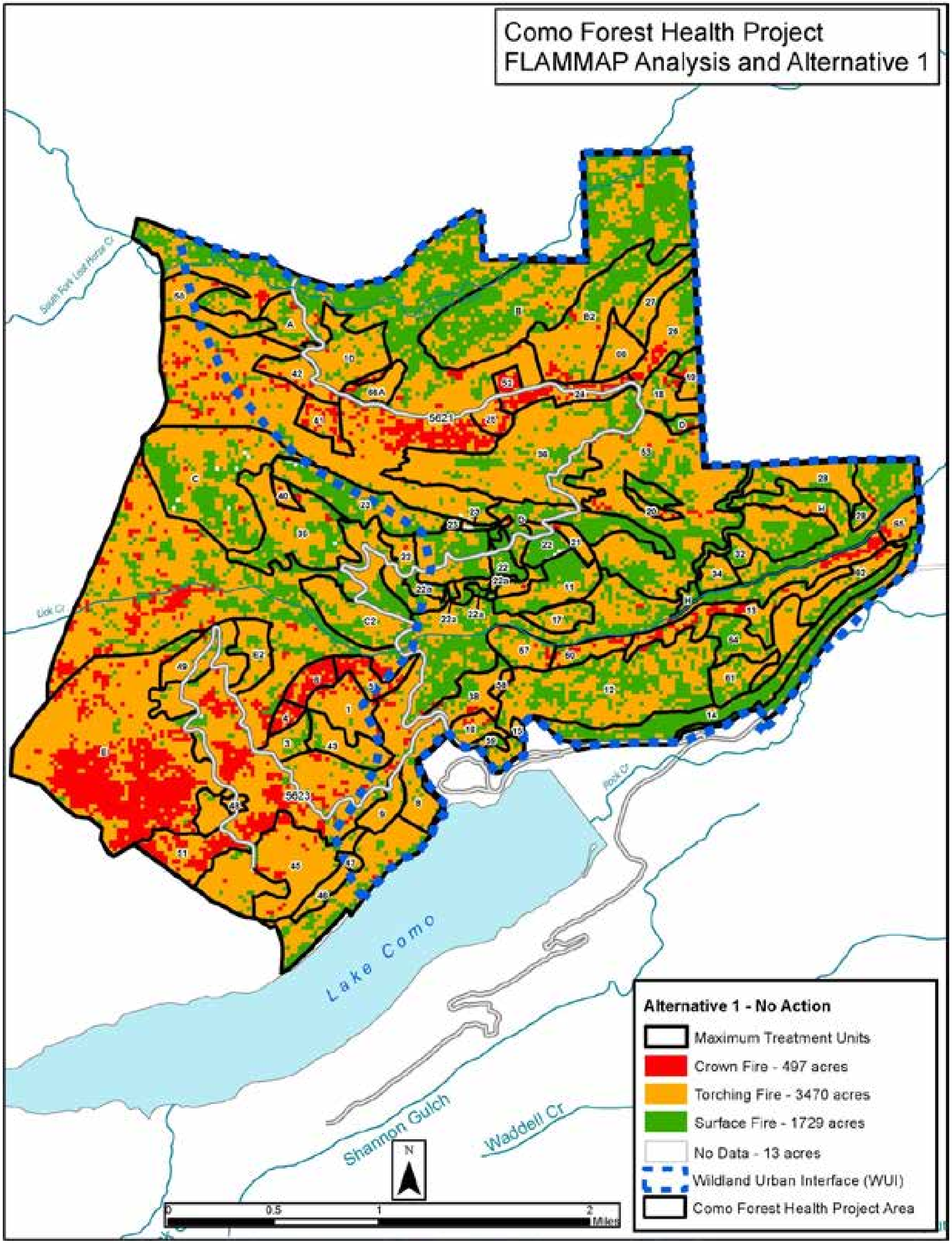

Figure 3.2- 6: Potential Fire Behavior in the Como Forest Health Project Area. This map displays existing conditions (Alternative 1).

Crown fires and torching trees concern fire management because embers are lofted in the fire's convection column and can be carried a mile or more in front of the main fire and start new fires. Spot fires severely limit the ability of firefighters to contain a fire. Spotting is hard to predict except that it is associated with high fire intensities, torching, crowning, and fire whirls (Rothermel 1983). Fires exhibiting long-range spotting pose some of the greatest threats to firefighter safety because they are extremely difficult to predict and control. Reducing excessive surface fuel loads, ladder fuels, and crown bulk density by increasing crown spacing decreases the potential for extreme fire behavior.

Wildland Urban Interface (WUI)

The (WUI) is in fire management unit 1 (FMU-1) and is 58% (3,259 acres) of the Como Forest Health project area. Federal fire policy direction for planning wildfire suppression strategies prioritizes the protection of life (both the public and firefighters) above private property and protecting natural resources (USDA 2009). As fire moves across a landscape and toward or within the WUI, hazards to the public and firefighters increase with as efforts increase to protect private property. However, the Bitterroot National Forest has no authority to conduct fuel treatments or other wildland fire mitigations on private lands.

Wildland fire exposure is high in the WUI and risks to public and firefighter safety and property damage increases. The risks increase as more people build homes in the WUI. The costs of fighting fire in the WUI are higher because more resources are required to support aggressive fire suppression strategies and protect the values at risk. For example, in 2006, the 8,500 acre Gash Creek Fire outside of Victor, Montana, burned primarily in the WUI and cost in excess of 8 million dollars to control. Nearly the same amount of money was spent on the Rombo Fire though the Rombo Fire was three times larger. The difference between the two fires was that the Rombo Fire burned largely outside of the WUI. Fuel treatments in the WUI reduce the potential of extreme fire behavior, decrease firefighter and public exposure to fire hazards, facilitate effective fire management and suppression, and move treated areas toward a more historic fire regime.

"The urban wildland interface community exists where humans and their development meet or intermix with wildland fuel" (Federal Register, January 2001). The WUI boundary was delineated in the Ravalli County Community Wildfire Protection Plan (June 2003, updated in 2010, Appendix D Map #9). The WUI width in Como Forest Health project area was determined by the fuels specialist based on site-specific values at risk (Figure 3.2- 6). The WUI boundary determines the level of response a fire start receives. It does not determine whether the area can or will be actively managed for fuels, or the strategies or tactics used to manage a fire. Every ignition in the WUI requires immediate attention due to the imminent risk to human properties or developments.

Some private lands adjacent to the WUI in the Como Forest Health project area have completed fuels treatment. The areas are small but as more fuels treatments occur and are maintained, more private lands would be easier to protect during a wildland fire. In addition to the protection of private lands, there would be greater opportunity to use wildland fire in the adjacent wilderness and roadless areas because the fire would be easier to manage and control in the treated areas. Fuels reduction on private as well as public lands would allow fire to play a more natural role in the ecosystem and increase fire management options during a wildland fire.

3.2.4 Environmental Consequences

3.2.4.1 Methodology

Analysis Boundary

The fire history analysis area boundary is the 6th Code HUC (Hydrologic Unit) because fires outside of the Como Forest Health project area tend to burn from west to east. The analysis area is 86,937 acres (Figure 3.2- 2).

The fire behavior analysis area is the Como Forest Health project area because this is where the treatments affecting fire behavior occur.

Field Measurement

Como Forest Health Project proposed treatment units were assessed by walk though field reconnaissance, satellite image interpretation, and LANDFIRE (Landscape Fire and Resource Management Planning Tools) and GIS data analyses. Field reconnaissance in 2010 and 2013 determined representative stands for stand level modeling. All treatment units were visited. Fuel models (Anderson 1982), photo fuel guides (Fischer 1981), and LANDFIRE data were used to estimate fuel model conditions throughout the treatment units. Method of assessment was based on fire groups (Fischer & Bradley 1987) and the FlamMap model. Fire Groups characterize the forest by vegetation and structure, fuel types and fuel structures, fire frequencies, and forest succession.

FlamMap (Version 5.0) is a spatial fire behavior mapping and analysis program that requires a landscape file, fuel moisture and weather data. The basic fire behavior calculations in FlamMap characterize fuel hazard in fire management planning. FlamMap makes independent fire behavior calculations (for example, fireline intensity, and flame length) for each location of the raster landscape (cell), independent of one another. There is no predictor of fire movement across the landscape, and weather and wind information are held constant. FlamMap outputs are useful for comparing pre- and post-treatment effectiveness and identifying hazardous fuel and topographic combinations, thus aiding in prioritization and assessment (Stratton 2004). LANDFIRE data was used for all required spatial inputs in the FlamMap analysis.

FlamMap Model

<u>Description</u>

FlamMap is the model we use to evaluate changes in fire behavior resulting from fuel treatments. FlamMap calculates fire behavior characteristics based on fuels, topography, and weather (Rothermel 1972; Finney 1998).

<u>Outputs</u>

FlamMap outputs are spatially explicit grids that display calculated fireline intensity and fire type category (no fire, surface fire, torching, or crown fire) at the resolution of input data. FlamMap outputs are calculated on a 30-meter by 30-meter pixel basis; changes in fire type after proposed treatments are calculated as acres.

<u>Required Inputs</u>

FlamMap uses percent slope, aspect, elevation, stylized fuel model, canopy cover, canopy base height, canopy bulk density, and percent canopy cover data layers. Weather is input as a single event without any temporal variation and is characterized by a 20-foot wind speed in an “uphill” direction.

Primary Use in Analysis

The Como Forest Health Project area uses FlamMap to predict changes in fire behavior after fuel reduction treatments. These results are analyzed using ESRI ArcMap and Microsoft Excel.

Assumptions and Limitations

The embedded fire behavior models in FlamMap assume constant weather, fuel continuity, constant fuel moistures, and that the fire is spreading in a steady-state. The fire models were formulated as one-dimensional point calculations, but have been utilized in two-dimensional spatial models using wave-front mechanics and Huygens' Principle (Finney 2004). Finney (2004) details assumptions and limitations of fire growth modeling are:

- The landscape file data used in the analysis was obtained from LANDFIRE. The fuel and vegetation parameters were interpreted from 30 meter resolution LANDSAT satellite images captured LANDSAT 2008 REFRESH and updated to include vegetation changes from natural disturbance and management activities since 2008 (www.landfire.gov). Raster layers are developed for treatments in each alternative. The modeling assumes that landscape vegetation changes since 2008 will not drastically affect modeling results. In this project, the campground thinning in 2012 and the SPA Seed Tree cut in 2012 were included in the model. Non-commercial thinning and the research units along NFSRs 5621 and 62931 were not modeled in the existing conditions because fuel model data from Landfire available. We assumed the post treatment conditions in these areas would reduce the potential fire behavior to surface fire.
- We also assumed treatments in Alternatives 2, 3, and 4 would be completed simultaneously. Though the treatments would not occur simultaneously, this assumption provides the same basis for comparing the model results between alternatives.
- Fire shapes are assumed to be elliptical under uniform conditions. Other shapes have been explored and reported, but are not completely supported. Fire shapes in discontinuous fuels will not be adequately modeled. Final fire shapes are not an output in FlamMap, but the models use a series of fire ellipses to determine overall fire behavior.
- Fire spread rate and intensity at a given vertex is assumed independent of the fire and environmental interactions; modeled fires are not influenced by neighboring fires. In reality, fire behavior during large plume-dominated fires is controlled by the fire-environment interaction and cannot be modeled. Therefore, the model likely under predicts fire behavior during a plume-dominated event or multiple large-fire events. This is a limitation of all current fire modeling efforts, but modeling of individual events is the best available
- Science and has been used with calibration to model large fires.
- Fire acceleration is assumed dependent of fuel type but independent of fire behavior. In reality, local environmental conditions may play a role in fire acceleration. Modeled fires may not be accelerated at the appropriate rate, but the effects of this on the outcomes of the model are not known. When modeling

real-time fire events, this problem can be overcome through calibration; however, this calibration cannot be done for a hypothetical landscape modeling exercise.

- Fires are assumed to instantly achieve the expected elliptical shape when burning conditions change (such as changes in wind speed or slope). This is an acceptable limitation for FlamMap because it does not incorporate a temporal element.
- Elliptical fire shapes are assumed to be fuel independent; meaning fire shape (not size) is only determined by the wind-slope vector. Empirical relationships indicate fire shapes are common across many fuel types, so this assumption is not likely problematic for surface fire shapes. However, there is less evidence that this relationship is adequate for determining shapes of crown fires.
- The assumption is that variation in wind speed and direction at a higher frequency than the wind stream resolution does not to affect the elliptical fire shape is incorrect. However, the importance of these fluctuations on overall fire growth and behavior is not known. Again, when modeling real-time fire behavior, calibration can be used to compensate for this assumption, but that is not possible for hypothetical landscape modeling.
- The origin of an elliptical fire is assumed to be located at the rear focus of the ellipse. Some researchers suggest that this assumption has not been adequately examined, but it is still the approach most widely used. In reality, fire may spread faster down steeper slopes due to debris rolling downhill, but this is not considered in the models.
- The spread of a continuous fire front can be approximated using a finite number of points. This assumption is valid in continuous fuel beds. Landscape-scale modeling is somewhat coarse and therefore the model will bypass some spatial detail.
- There is a poor estimation of fire spread where spotting, fire whirls, and fire induced atmospheric disturbances occur. These phenomena can be predicted but the areas of occurrence cannot yet be modeled.

Anticipated Consequences of Limitations

We considered the limitations of the FlamMap analysis listed above and determined they did not have substantial effects on the comparison of the alternatives. FlamMap appropriately compares the relative changes in fireline intensity, fire type and arrival time to show the effectiveness of treatments in changing fire behavior.

Fire type is used to describe fire behavior in the Como Forest Health project area. One weather scenario was used in all fire behavior modeling to simulate “Extreme” fire danger conditions that typically occur during the peak fire season on the Bitterroot National Forest. Modeling inputs included a maximum temperature of 85 degrees Fahrenheit, a 10-hour fuel moisture of 4%, and live fuel moisture of 70%, with three wind directions from the south, southwest and west at 20 miles per hour (20ft wind-speed). All weather and fuel moisture inputs are detailed in the project file.

Incomplete and Unavailable Information

The effect of treatments on fire behavior outside of treatment zones was not modeled because it requires the temporally explicit FARSITE (Finney 2004) model. Using FARSITE on the entire Como Forest Health Project analysis area would be very difficult due to the number of variables required in the model for the fire to burn across the whole area. The use of FARSITE is not necessary to compare the treatment effects between alternatives.

Fires were not recorded in 1990, 2000, and 2010 in the fire database for this project area. Unattended campfires were found and extinguished so they did not develop into larger fires.

3.2.4.2 Alternative 1 – No Action

Direct Effects and Indirect Effects

Potential fire types would not change in the project area under the No-Action alternative (Table 3.2- 3, Figure 3.2- 7). Small areas of non-commercial thinning, approved in previous decisions, are not large enough to change fire behavior in the project area.

Table 3.2- 3: Fire Type Area (acres) by Alternative in the Como Forest Health Project Area, Modeled with Uphill Wind Scenario

Alternative	Surface Fire (acres)	Torching (acres)	Crowning (acres)
1	1,729	3,470	497
2	3,611	1,921	165
3	2,914	2,467	315
4	2,828	2,406	462

As forest structure becomes more continuous and fuel loads increase, more area would transition from surfaceto torching fires to crown fire. Prescribed fire would not be applied to reduce fuels and Douglas-fir and other shade-tolerant tree species would continue to grow in the understory. Areas of surface fire would develop into areas of torching fire and areas of torching fire would develop into areas of crown fire over the next 20-25 years.

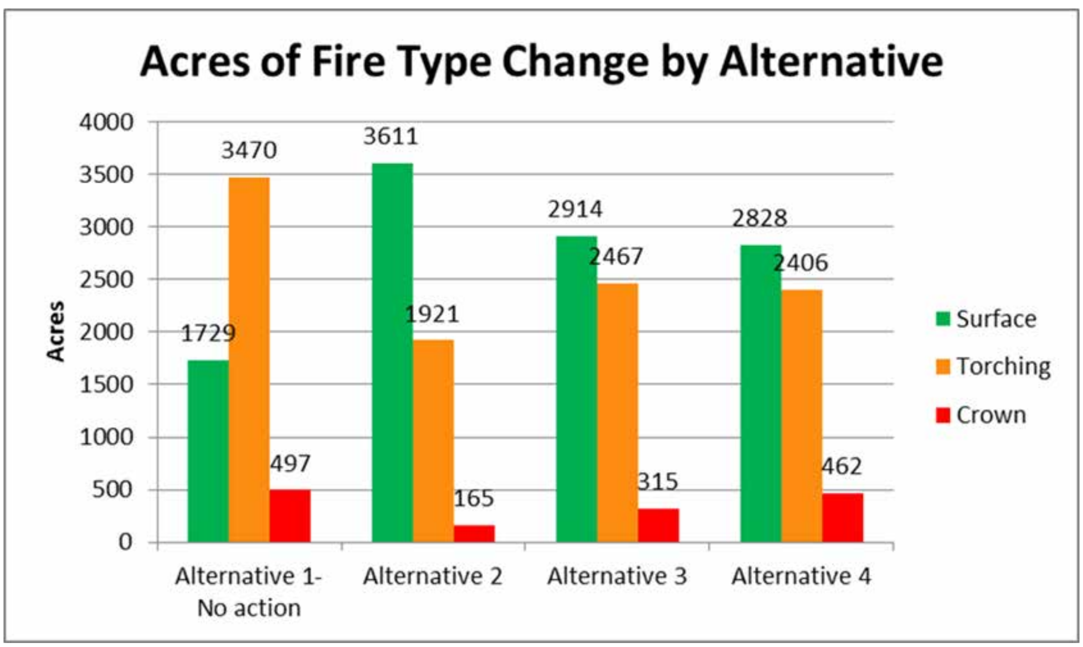

Figure 3.2- 7: Acres of Fire Type by Alternative - Como Forest Health Project Area, modeled with Uphill Wind Scenario

Areas of beetle infestations would be prone to crown fire while red needles remain on the trees and during periods of extreme weather. As forest density increases and pine trees become stressed, beetle infestations would increase. These conditions would ultimately increase the risk of high severity fire in this high use recreation area adjacent to private land.

Fire management responses would continue to emphasize aggressive suppression to prevent fires moving onto private lands and to prevent the loss of large ponderosa pine susceptible to mortality from high fuel loads and ladder fuel development.

3.2.4.3 Alternative 2- Proposed Action

Direct and Indirect Effects

The area of surface fire would increase under Alternative 2 by 1,882 acres and the area of torching and crown fire would decrease by 1,449 and 332 acres, respectively (Table 3.2- 3, Figure 3.2-7).

Changes in fire types are due to a reduction of surface, ladder, and canopy fuels. Additional reduction in fire type is expected outside of treatment areas because fires would move through treatment zones as slower moving fires, or flank around treatment areas. The reduction in area of crown and torching fire types to surface fire types creates breaks in fuels continuity and provides firefighters opportunities to aggressively fight fire using direct and indirect tactics. Figure 3.2- 8 shows the locations and distribution of modified fire behavior.

<u>Prescribed Fire and Timber Harvest – 1,476 acres (all commercial harvest units)</u>

Fuels reduction treatments with commercial harvests and prescribed fire decrease fire behavior by reducing overall fuel load and increasing the space between tree crowns. Rates of surface fire spread may increase with treatment because the forest floor is more exposed to solar heating, wind and fire pass more easily through the stand, and herbaceous vegetation proliferates with more direct sunlight. The absence of ladder fuels prevents surface fires from burning into tree crowns, which reduces the fire severity and fire type.

<u>Prescribed Fire Only (1,322 acres; Units, A, B, C, C2, D, E, E2, H)</u>

In unit H, stand 77010120 (22 acres), is the only portion of this unit, which could be burned successfully without modifying fuels and having minor tree mortality. It has a southwest aspect and current stand structure and composition favor a prescribed burn without prior treatment. However, the rest of unit H is even-aged, mature Douglas-fir stands, on north aspects with heavy crown closure and very little understory that could be considered ladder fuels. Fuel loads within these Douglas-fir areas range 5-15 tons/acre. Unit H surrounds a previously harvested ponderosa pine stand managed as a seed production area. Prescribed fire in Unit H, other than stand 77010120, would increase tree spacing through tree mortality with low to moderate severity fires. A low severity fire would retain large overstory trees but moderate severity fire would cause higher levels of mortality in the overstory.

Unit E is within fire groups 6, 8, and 9 and is composed of Douglas-fir, sub-alpine fir, spruce, and lodgepole pine (*Figure 3.2- 3*). It is a mixed severity unit and the treatment objective would be to create vegetative mosaics on the landscape Figure 3.2- 9).

Vegetative mosaics reduce the probability of widespread wildfire damage on watershed values (Fischer and Bradley 1987).

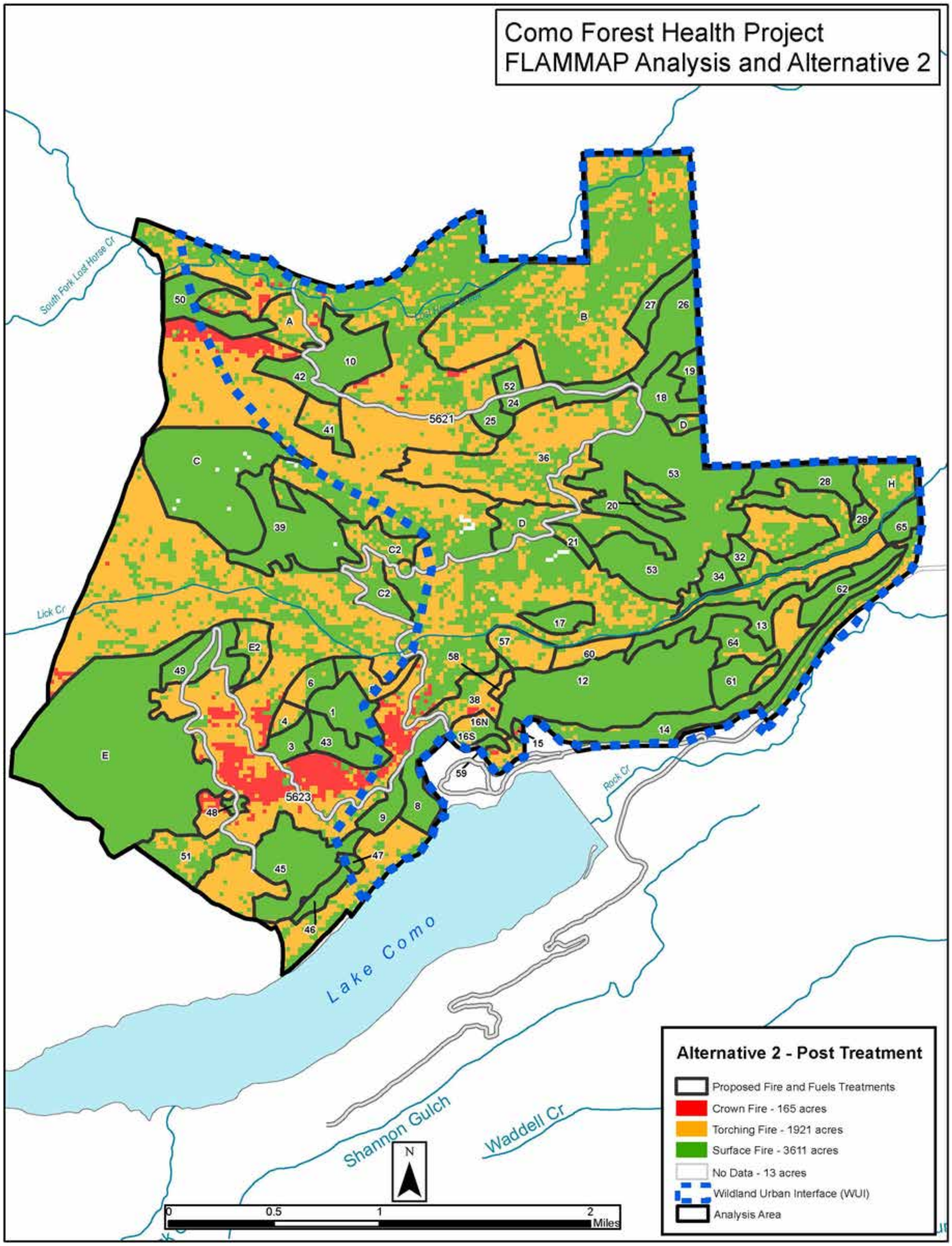

Figure 3.2- 8: Potential Fire Behavior in the Como Forest Health Project Analysis Area after Treatments under Alternative 2

Figure 3.2- 9: Middle of Burn Unit E. Moderate to High Severity Burn Potential with these Fuel Types under Wildfire Conditions.

Figure 3.2- 10: Example of 10"dbh or less non-commercial thinning & resulting slash loads near Rock Creek Horse Camp – Lake Como (9/20/10) before piling.

Units B, C2, and E2 (fire groups 4 and 6) are primarily ponderosa pine/Douglas fir, and have departed from historical ranges in structure, species composition, and fuel loads. To achieve low mortality levels following prescribed burning, mechanical treatments are needed prior to burning. Prescribed fire is not a precise tool for modifying stand structure and composition. There is less predictability in post treatment stand structure following prescribed fire than when used in conjunction with thinning treatments. If fire is introduced into these units without modifying vegetation stand structure, the size and severity of the prescribed fire would not be characteristic of a low severity fire. Prescribed burning without pre-treatment (aka slashing or fuels modification) will burn hotter and have a more severe fire effects, such as increased torching and tree mortality due to a higher density of trees. Units that are pre slashed/scattered and left until the needles fall; provide a more uniform surface fire. Fire severity can be modified by slower ignition patterns and backing patterns.

<u>Non-Commercial Thinning with Prescribed Fire (approximately 531 acres; Units 13, 14, 24, 28a, 36, 43, 51, 52, 64)</u>

Unit 36 is a ponderosa pine plantation with current mountain pine beetle activity. After treatment, monitoring of mountain pine beetle activity would occur before prescribed burning commenced. Non-commercial thinning units are usually piled and burned if post-treatment review determines slash is in excess of site conditions (Figure 3.2- 10). Tree mortality from pile burning is limited since piles are generally located away from remaining trees. Understory burning would be completed in units identified in this analysis following post-treatment review.

3.2.4.4 Alternative 3 – No New Roads

Direct and Indirect Effects

The area of surface fire would increase under Alternative 3 by 1,185 acres and the area of torching and crown fire would decrease by 1,003 and 182 acres, respectively (Table 3.2- 3, Figure 3.2- 7). Figure 3.2- 11 displays the locations and distribution on modified fire types.

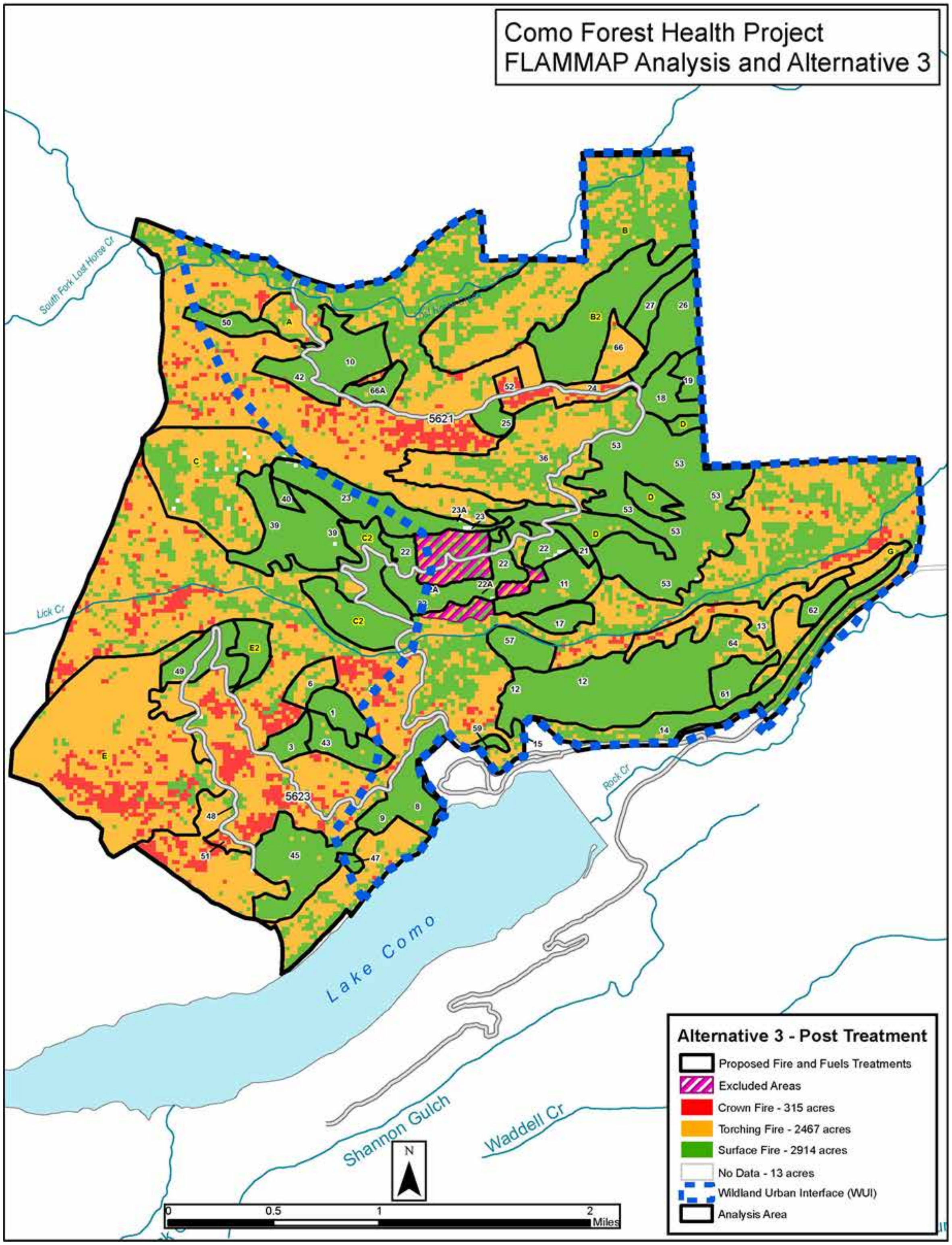

Figure 3.2- 11: Potential Fire Behavior in the Como Forest Health Project Area after Treatments under Alternative 3

Prescribed Fire with Timber Harvest (1,306 acres; Units)

Fuels reduction treatments with commercial harvest and prescribed fire decrease fire behavior by reducing overall fuel load and increasing the space between tree crowns. Rates of surface fire spread may increase with treatment because the forest floor is more exposed to solar heating and wind. The absence of ladder fuels prevents surface fires from burning into the crowns, which reduces fire severity.

Prescribed Fire Only (934 acres; Units, B, C, D, E, G)

Units B and G (fire group 6) are primarily ponderosa pine that have departed greatly from historical ranges in structure, species composition, and fuel loads. Prescribed fire is not a precise tool for modifying stand structure and composition. Post-treatment stand structure is less predictable following prescribed fire than when thinning treatments precede the prescribed fire. To achieve low mortality levels following prescribed burning, mechanical treatments need to occur before burning unless fuel conditions and structures are within their historic ranges. If fire is introduced into these units without modifying the fuel conditions and vegetation structure, fire severity would likely be higher than is characteristic of the site.

Units C (fire groups 6, 8 and 9) and Unit D (fire group 5) are a mix of some ponderosa pine and Douglas fir. Unit C also has lodgepole pine as a component at the highest elevation of the unit.

Unit E is within Fire Groups 8 and 9 and is primarily composed of Douglas-fir and lodgepole pine. It is a mixed severity unit and the treatment objective would be to create vegetative mosaics on the landscape. Vegetative mosaics reduce the probability of widespread wildfire damage on watershed values (Fischer and Bradley 1987). The proposed prescribed fire would be mixed severity where some of the stand would be killed to create openings for regeneration and break up forest continuity. A wildfire under extreme fire conditions could burn the entire unit as a stand replacement fire. If the wildland fire burns too hot, forest regeneration may be delayed and brush field would develop.

Non-Commercial Thinning with Prescribed burning (approximately 1, 020 acres; Units 8, 11, 13, 14, 15, 22a, 23a, 24, 28a, 36, 43, 51, 52, 64, 66, 66a, A, B2, C2, E2)

Unit 8 is a mix of ponderosa pine and Douglas-fir. The majority of the unit is comprised of trees greater than 12” dbh. There are moderate amounts of trees under 7” dbh. This unit needs more than understory thinning because the basal area will be over 120 BA, primarily in ponderosa pine, which will be at risk to mountain pine beetle. The understory thin would treat ladder fuels but would not reduce mountain pine beetle hazard. Unit 8 surrounds Three Frogs campground which was harvested in 2012 which left untreated could pose an increased fire risk to high value recreation sites.

Unit E2 has a stand composition similar to Unit 49, which is comprised of warm dry Douglas-fir. The proposed understory thinning removes ladder fuels but does not reduce current basal area. Without commercial treatment in Unit E2 stand mortality will be higher from scorch and bark beetle mortality. Understory treatment after mechanical treatment followed by prescribed burning would reduce the slash below 2 ft and less than 15-20 tons/acre.

Units 66 and 66a are plantations that may be slashed, piled, and burned if additional slash reduction is necessary. The plantations are between 5 to-25 yrs old, less than 8"dbh, with crown base heights less than 3meters (FIRE-064, J. Thompson 2011 p. 359). Mortality would be high if these plantations are burned before the appropriate stand age and surface fuels surrounding the trees have decayed. Thinned plantation units would be evaluated post-treatment for slash treatment needs by the fuels specialist and silviculturist.

3.2.4.5 Alternative 4 – Wildlife Habitat and Scenery

Direct and Indirect Effects

The area of surface fire would increase under Alternative 4 by 1,099 acres and the area of torching and crown fire would decrease by 1,064 and 35 acres, respectively (Table 3.2- 3, Figure 3.2- 7). Figure 3.2- 13 displays the locations and distribution on modified fire types.

<u>Prescribed Fire with Timber Harvest (1,121 acres all commercial units, Table 3.1-6)</u>

Commercial harvest followed by prescribed fire decreases fire behavior by reducing overall fuel load and increasing the space between tree crowns. Rates of surface fire spread may increase with treatment because the forest floor is more exposed to solar heating, wind passes more easily through the stand, and herbaceous vegetation proliferates with more direct sunlight. Figure 3.2- 12 shows the crown spacing created by harvest in the 1990s and regeneration of seral tree species that has occurred in the last 20 years. The absence of ladder fuels prevents surface fires from burning into the crowns, which reduces the fire severity and fire type.

Figure 3.2- 12: Unit 22 Lick Creek Research Units (similar to Units 22A, 23, & 22A

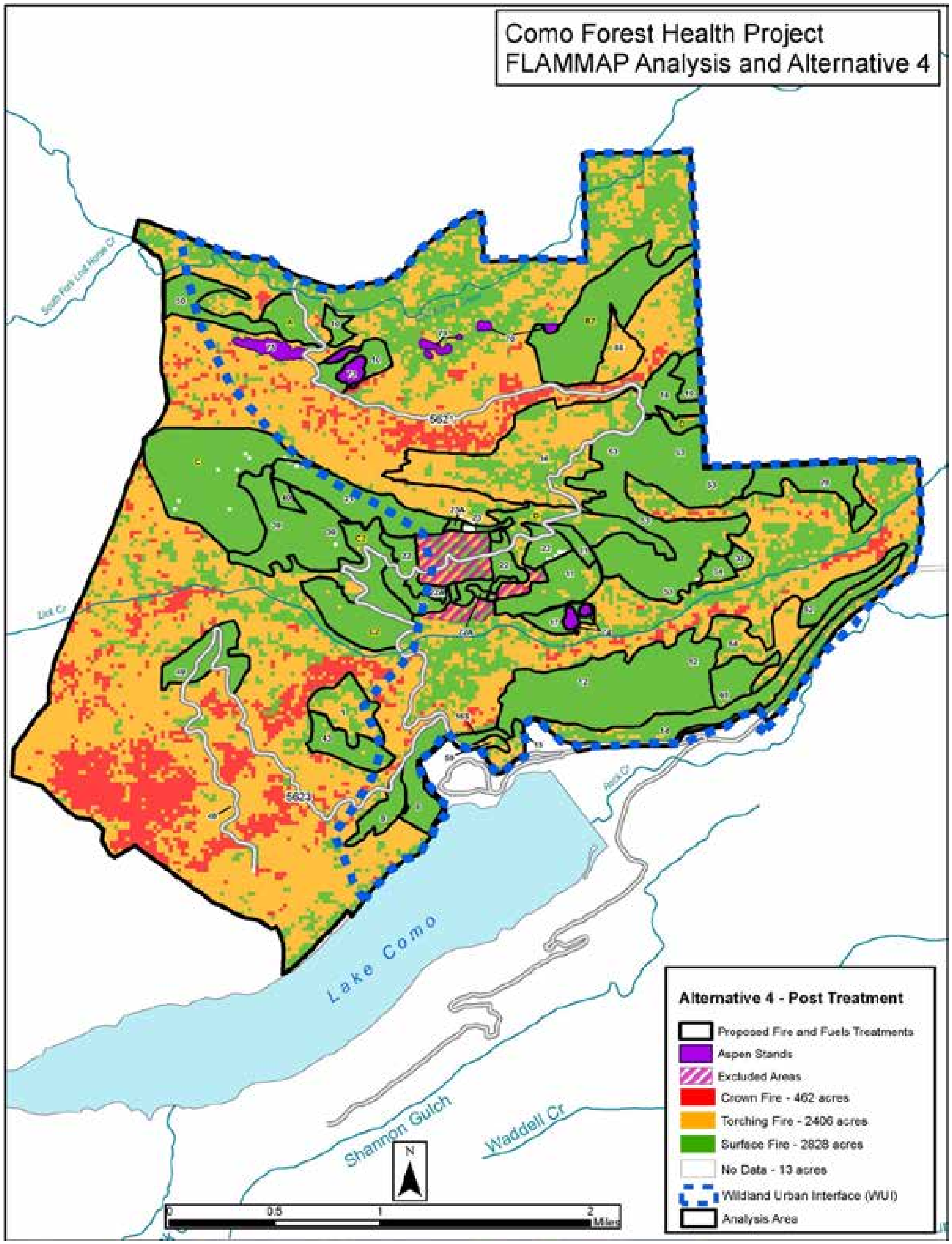

Figure 3.2- 13: Potential Fire Behavior in the Como Forest Health Project Area after Treatments under Alternative 4

Prescribed Fire Only (202 acres; Units C, D)

Units C and D have vegetation attributes within the historic range of VRU 2. Prescribed fire would produce a low severity burn. Current stocking levels are relatively low in these units and burning could be accomplished with minor amounts of tree mortality.

Non-Commercial Thinning with Prescribed burning (approximately 743 acres; Units 8, 11, 14, 22a, 23a, 28a, 36, 43, 64, 66, A, B2, C2)

Unit 8 is proposed for a non-commercial thin (similar to Figure 3.2- 14). The only benefit to understory thinning is to manipulate the ladder fuels. Without reducing the current basal area, it remains moderate to high risk for mountain pine beetle mortality. The understory thinning alone does not provide for landscape treatment in reducing mountain pine beetle mortality.

Figure 3.2- 14: Examples of piling slash less than 7 inch DBH and leaving 10" slash as coarse woody debris – Non-commercial thinning and piling around Lake Como boat ramp (9/20/10)

Cumulative Effects

Analysis Area

The cumulative effects analysis area encompasses the area north to the Lost Horse watershed, south to Lake Como, west to unnamed ridge east of Koch Mountain, and east to the Lake Como Road/Private land boundary. This area was selected based on natural barriers and drainages. Effects of fuels reduction should not exceed these boundaries. Smoke issues due to prescribed burning in the effects analysis area are addressed in the Air Quality Section of this chapter.

Past, Present, and Reasonably Foreseeable Activities

The existing condition reflects applicable past actions. All activities that have occurred in the cumulative effects analysis area for which effects are known are listed in Appendix B.

Timber Harvest and Fuel Reduction

The effects harvest activities have on fire behavior depend on the location and type of treatment. Strategically placed harvest activities or those that modify ground, surface, or aerial fuels can reduce potential fire behavior from crown to surface fire (Figure 3.2- 15). Increasing the distance between tree crowns and treating the logging slash after timber harvest reduces fire spread and intensity and prevents flames from reaching into the tree crowns. If excess logging slash is not reduced after harvest, it can compound fire behavior and increase the potential a fire would transition from surface fire to crown fire.

Past large-scale vegetation treatments could combine with this project to have a cumulative effect on fire and fuels resources. Finney (2000) found that overlapping treatments which disrupted the heading and spread of a fire decreased the size and intensity of the fire.

Figure 3.2- 15: Fuels in Unit 50 in all alternatives (example of past timber harvest and fuels reduction – desired condition for overstocked stands

Several timber harvests, mechanical fuels reductions, and prescribed fires have been completed in the cumulative effects analysis area over the past several decades (Appendix B Past, Present & Forseeable Projects and FACTS **(**Forest Service Activity **Tracking System)**. Most of the treatments however, affected small areas relative to wildland fires and may not be large enough to disrupt fire spread. The Rock Creek fire burned 11,967 acres in 1988 and the Rockin fire burned 5,933 acres in 2005. The effects of planned TSI thinning, current and proposed fuel treatment, and timber harvest projects within and adjacent to the Como Forest Health project area would combine with those of the Como Forest Health Project alternatives and provide effective resistance of fire spread onto private land. The Como Hazard Tree project treated approximately 250 acres with commercial thinning, slashing non-commercial material, and pile burning. This treatment in combination with treatments proposed in the Como Forest Health project would aid the protection of the Lake Como recreation area.

In Trapper Bunkhouse, a combination of commercial harvest, non-commercial thinning, and prescribed fire are planned on 5,827 acres. Commercial harvest has been completed, and the thinning and prescribed fire treatments are in process for the next 5-10 years. These treatments would combine with the effects of Alternatives 2, 3, and 4 to create a largely contiguous buffer and decrease potential wildfire behavior in the WUI west of Darby to Lost Horse drainage. Under Alternative 1, the treatments would remain discontinuous and the potential wildfire behavior in and toward the WUI would remain high. On the west side of private lands, stand treatments under Alternative 2 would combine with the effects of past wildfires to reduce potential fire behavior on the lower sections of Lost Horse, Lick Creek, and Rock Creek drainages. No fuel reduction would occur under Alternative 1 and treatment areas are too small under Alternatives 3 and 4 to cumulatively affect large scale reduction in increased potential fire behavior.

Alternatives 2, 3 and 4 would reduce potential fire behavior before the fire reaches private land on the northeast side of the project area. Fuel treatments and appropriate slash treatments on private land would combine with those on National Forest and further reduce potential overall fire behavior. Fuel reduction treatments have occurred on some private properties adjacent to the Como Forest Health Project area in the last several years. These fuel treatments, especially those adjacent to treatment units, extend the area of reduced fire behavior.

Roads

Road access is an important issue to wildland fire suppression. Access directly affects response times for wildland firefighters and the types of equipment that can access wildland fire situations. The longer it takes fire personnel to access a fire, the more resources will be needed to extinguish the fire. Length of response may also determine whether the fire will become a long-term project fire. Wildland fire suppression success is due in part to short response times to ignitions within the project area.

Recreation

Recreation use in the analysis area is high. There is the potential for increased recreational vehicles and human caused fires to start on the primitive designated roads and trails and campsites. Examples of methods of ignition by vehicles include dragging chains, driving through tall grass or light flashy fuels, no spark arresters on vehicles, vehicles without heat shields, debris in the undercarriage that heats up and falls off, possible brake problems, or the vehicle itself starting on fire.

Unattended campfires at dispersed campsites along NFSR 5621, between Lake Como and Lost Horse road, are common sources of human-cause ignitions .

Prescribed Fire

The use of prescribed fire following timber harvest and fuels reduction activities reduces potential fire behavior and severity. The use of fire reduces duff, litter, and dead and down woody material that has accumulated after years of fire exclusion, and reduces activity fuels. The use of fire restores and maintains fire-adapted ecosystems, reduces the potential of high-intensity wildfire and overstory tree mortality, and increases fire management options.

3.2.4.6 Consistency with Forest Plan, Laws, and Regulations

All alternatives in the Como Forest Health Project area are consistent with hazardous fuel reduction, rehabilitation, and restoration in the National Fire Plan. The project aligns with objectives and standards outlined in the Bitterroot National Forest Plan and the Bitterroot Fire Management Plan for management areas (MA-1, 2, 3A, 3B, and 3C). Coordination of fuels treatment and slash cleanup minimizes fire danger and insect and disease problems are addressed Alternatives 2,3 and 4.

Air quality will be maintained at a level adequate for the protection and use of the National Forest System lands that meets or exceeds State and Federal air quality standards with appropriate mitigations. Prescribed fire objectives for smoke management will be met within the constraints established by the Montana/Idaho Airshed Group Memorandum of Understanding.

The actions proposed in Alternatives 2, 3 and 4 lead to a trend of decreased probability of crown fire over a large extent of the treated stands. This would avoid potential detrimental effects on wildlife habitat continuity. The alternatives reintroduce fire as an ecosystem function throughout the project area. The scale varies between alternatives, however, all perpetuate the role of fire in these forest types and decrease the risk of prescribed fire implementation.

Alternatives 2, 3, and 4 are consistent with forest plan direction and address resource requirements in the project area. Alternatives 2, 3, and 4 trend towards desired future conditions with the proposed treatments. The implementation of planned ignitions would be in compliance with air quality standards and the clean air act.